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INFORMAL SOCIAL NETWORK FORMATION IN NAVY TRAINING UNITS.(U)

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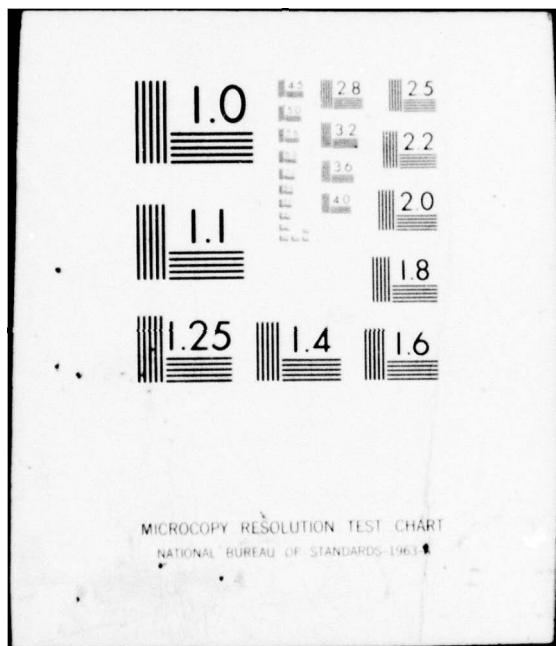
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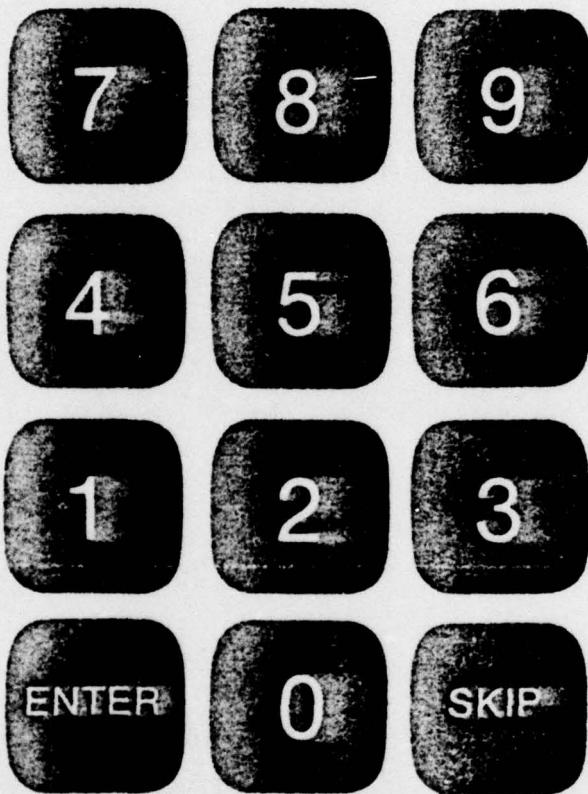
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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) This narrative report briefly recapitulates a theory of informal group formation relating proximity, similarity and social structure variables to interpersonal attraction. It describes the data base gathered to test the theory and the empirical results of the analysis at the time of final report preparation.			

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# Observations

Informal Social Network Formation in Navy  
 TITLE Training Units: Narrative Final Report

AUTHOR Richard E. Sykes, Ph.D.

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## OBSERVATIONAL RESEARCH

MINNESOTA SYSTEMS RESEARCH, INC.  
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**FR #1 - April 30, 1977**

**INFORMAL SOCIAL NETWORK FORMATION IN  
NAVY TRAINING UNITS:  
NARRATIVE FINAL REPORT**

**by**

**Richard E. Sykes, Ph.D.**

**Prepared as part of the project Informal Social Network Formation in  
Navy Training Units sponsored by the Organizational Effectiveness Research  
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INFORMAL NETWORK FORMATION IN  
NAVY TRAINING UNITS:  
FINAL REPORT

My original impulse to conduct this series of investigations grew out of the racial confrontations which troubled the Navy toward the end of the Viet Nam War.<sup>1</sup> My intent was to gain further understanding of the dynamics of informal group formation and group conflict. I developed a theoretical perspective which was an attempt to integrate conflict theories of ethnic stratification (for instance, that of Noel) with social psychological theories of informal group formation, especially those which emphasized factors associated with interpersonal attraction. It might be described as a theory of informal group formation within a theory of formal organization within a macrotheory of ethnic stratification. Nine conclusions emerged from the first study:

- 1) While in boot camp, most recruits interact primarily with recruits in adjacent racks (in the compartments).
- 2) When given a choice, they will interact with an adjacent recruit who is similar in color, religion, and education.
- 3) If there is no similar adjacent recruit, others who are similar will be sought out during the less structured time periods.
- 4) When formerly adjacent recruits are moved apart, they will generally not continue to interact with each other. Their interaction

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<sup>1</sup> Generally I use the term "color" rather than race. While the concept of race may be useful in some sciences (e.g., physical anthropology) in normal human relations it appears to be the phenomenon of a difference in color to which persons react primarily, and they react in terms of the local norms associated with that difference.

rate with new adjacent recruits will also be less.

5) Even during boot camp, groups begin to emerge which endure over time. Generally, while such groups may be composed of adjacent recruits, similarity factors such as color, language, religion and education, appear to be more important. Cliques based on overt similarity begin to emerge at a very early point in training; although the highly structured conditions of boot camp prevent these cliques from becoming as strong as they might become later in regular Navy life.

6) When dissimilar recruits are not adjacent to one another, they are not likely to interact. Also, when they are adjacent to one another, they are less likely to interact than they are with those who are similar.

7) While black recruits talk to other blacks about twice as much as their proportional representation would indicate, in fact, blacks are more integrated than whites. Under the same conditions of similarity and dissimilarity, blacks will more likely interact with whites than whites with blacks.

8) Among the subject recruits, overt hostility towards dissimilars was rare. Individual conflicts did exhibit some tendency to polarize the company and to turn personal disputes into group disputes.

9) There may be some tendency for recruits from large urban areas to bring their conflicts into the Navy, and to continue them during the course of training (Fox, Sykes and Graham, 1973).

These data were reexamined and the conclusions slightly modified in Sykes, Larantz and Fox (1976).

The theory was then revised and twenty-six microtheoretical propositions were developed. These constitute an overall program of research much broader than this project. They are as follows:

- (I) Given: that newly enlisted naval personnel experience relatively similar supervision, tasks and working conditions, and have little opportunity to compare themselves with other naval personnel.
- Then:
- (i) Proximity leads to interaction.
  - (ii) Similarity leads to interaction.
  - (iii) Similarity and non-proximity leads to an amount of interaction not significantly different from dissimilarity and proximity.
  - (iv) Similarity and proximity lead to significantly higher rates of interaction than similarity and non-proximity, or dissimilarity and proximity.
  - (v) Dissimilarity and non-proximity lead to significantly less interaction than similarity and proximity together, similarity and non-proximity or dissimilarity and proximity.
  - (vi) Enforced proximity only with dissimilars increases the likelihood of seeking out similars during cessation of enforcement.
  - (vii) Generally, as frequency of interaction increases a positive feedback effect occurs, such that initial increases accelerate.
  - (viii) As interaction with some increases, interaction with others decreases.

(ix) Informal groups, defined by higher frequency of interaction

of some together with low frequency of interaction with  
most, will tend to be made up of similars.

(x) Informal groups will develop repeatable or habitual

activities including 1) inhabiting specified territory  
(sampling area location); 2) sharing recreational  
activities (liberty); 3) taking similar times together  
(sharing the same watch, for instance).

(II) Given: that newly enlisted naval personnel undergo a

process of job and training differentiation at the end of basic training,  
so that factor of supervision, task and working conditions are no longer  
similar, and that they now have more opportunity for comparison of  
differences in rewards and costs, supervision, tasks and working conditions.

Then: (xi) Similar working conditions lead to interaction.

(xii) Similar tasks lead to interaction.

(xiii) Similar conditions of supervision lead to interaction (these  
three factors now termed "work similarities").

(xiv) Generally, personal similarities, and work similarities  
will combine to increase interaction.

(xv) Because of the additional effect of work similarities  
informal groups with more definite boundaries will tend  
to emerge during advanced training and duty assignments.

(xvi) These informal groups will develop repeatable or habitual  
social activities.

(xvii) When these informal groups seek the same goals, but the  
means to these goals are limited, conflict will develop.

(xviii) When these informal groups have the opportunity to compare themselves to other informal groups, and when this comparison results in the belief that groups are rewarded contrary to the principle of distributive justice, inter-group conflict may develop.

(xix) The amount and type of conflict will be a function of the extent to which groups believe adequate channels are available to make known and secure redress of inequities.

(xx) Because of the additional effect of work similarities, which in turn increase the likelihood of a cohesive informal group forming, informal group conflict will be more likely after recruit training than during recruit training.

(III) Given: that as job and training differentiation occur, the need to coordinate different specialized work roles increases, and that the need for coordination may be horizontal (between workers of similar status but different specialities), or vertical (between workers in relation of subordination or superordination to one another)--and

Given: that the number of men in any particular work role differs, so that there may be many men in a particular work role and who therefore experience similar conditions of supervision, similar tasks and similar working conditions, and other men who perform tasks, under working conditions, under supervision, that few other men experience--

(xxi) Cohesive informal groups will be more likely to form among men who not only have personal similarities, but whose work roles are more frequent (so that there are more men with work similarities), than among men who have personal

similarities but not work similarities in common (because there are few men with that particular specialty).

- (xxii) Cohesive informal groups are more likely to participate in conflict.
- (xxiii) Groups whose work roles are more frequent are more likely to participate in conflict (derived from xviii, xx, xxi).
- (xxiv) Men who have been trained in a specialty but not in a group in which they must coordinate their activities will have difficulty adjusting to their work group.
- (xxv) Men who have been trained together with other men in a specialty, but who, after training must exercise their specialty in coordination with different specialties will take longer developing informal group affiliations than those who, after training, must exercise their specialty with others of the same specialty. (This is a derivation from propositions xi - xiii that work specialties increase interaction.)
- (xxvi) The more specialized and rare a rating the less the likelihood that the rating will be a member of an informal group which is highly cohesive.

This particular project had several specific goals:

- 1) To retest the conclusions of the first study by manipulating proximity variables;
- 2) To examine more fully the effect of similarity, expanding from consideration of a relatively few demographic similarities to attitudinal and instrumental similarities;

- 3) To test whether intragroup competition between subgroups varying in heterogeneity will increase solidarity between dissimilars in those subgroups;
- 4) To develop the methodology of collecting and analyzing interaction data in large spontaneous groups, a precondition of further research;
- 5) To conduct a pilot study of the differences in friendship formation between the large group environment of ATR and the individualized, small group environment of A school.

#### Theoretical Elaboration

The previous study utilized the traditional concept of proximity. This concept seemed increasingly inadequate and non-specific. A review of the literature published since Festinger, Schacter and Back's study (1950) showed that while evidence supported the relationship between proximity and attraction, few studies sought to explain this relationship. Even the concept of functional distance was neglected.

A new theory of proximity and attraction was developed integrating the concepts of territoriality and likelihood of common occupancy into a negative reinforcement paradigm (Sykes, 1977a). Likelihood of common occupancy was hypothesized to be a function of a) small objective space; b) frequency of occupancy of that space by each person; c) duration of occupancy of that space by each person; d) the extent to which the schedules of occupancy of that space by each person overlap.

The smaller the space, the more frequent the occupancy, the longer duration of occupancy, and the more overlapping the schedules of occupancy

the greater the likelihood of common occupancy. The greater the likelihood of common occupancy the more likely that subjective personal spaces will intersect. The more these spaces intersect the more the territoriality drive will be aroused. The more it is aroused and then reduced by symbolic acts of reassurance, the more each person will be associated by the other with removal of the noxious stimulus. The more such negative reinforcement occurs the more the attraction. Of course, if one or both actors do not provide symbolic acts of reassurance, then the drive will not be reduced. Under such circumstances proximity will lead to repulsion not attraction (King, 1966). As Berscheid and Walster (1969, p.49) wrote: "While propinquity may be a necessary condition for attraction, it appears that it also may be a necessary condition for hatred."

Likelihood of common occupancy considered in the context of the positions actors occupy in a particular social structure is termed acquaintance opportunity. Norms relating to relations between position incumbents occupy, facilitate or inhibit acquaintance opportunity by increasing or decreasing likelihood of common occupancy. In the context of formal organizations where interpositional norms are administered, likelihood of common occupancy or acquaintance opportunity can be partially controlled. Many decisions by administrators have the covert function of facilitating or inhibiting acquaintance opportunity.

It was therefore necessary to place proximity and similarity variables in the context of a theory of friendship formation and social structure (Sykes, 1977b). Beginning with a definition of friendship as the co-occurrence of attraction with relationship, factors were examined which lead to each and then to their co-occurrence. Social structure consists

of positions and their relationships. Characteristics of positions in social structure which influence friendship include acquaintance opportunity, rank and cooperative versus competitive interests. Norms associated with positions which influence attraction include norms of social desirability (including a norm of desirability of attraction) and norms of etiquette. Normatively governed interpositional relations are controlled by positive and negative sanctions. The probability of sanction can be anticipated by a position incumbent. Shaping is unnecessary since the incumbent already possesses information about the reinforcement schedule.

#### Methodology

To test the propositions implied in the statement of goals, a field experiment was designed. Attitudinal, demographic and sociometric data were to be collected on the subjects in RTC prior to their assignment to ATB.

Six ATB units were then to be studied. Two of each were to have proximity relations between blue collar and middle class recruits varied systematically in rack assignment in their compartment and desk assignment in the classroom. There were three conditions: random assignment, assignment to maximize segregation by SES; and assignment to maximize integration by SES. Originally the similarity variable to be manipulated was color rather than SES (for description of SES measure see Sykes, 1977d). This was not permitted, but this was not considered a major obstacle since the statistical tests contemplated allowed for tests by color in any event.

A second manipulation called for the creation of intragroup competition by creating subgroups within the classroom which received the award of excuse from field day (cleaning the compartment) for the best performance in certain "hands on" learning tasks and achievement on tests. These groups varied in heterogeneity of SES composition.

It was assumed that the cognitive structure of interaction and affect might differ from the objective behavioral structure. Therefore data on both were collected.

#### Data Base

The data consist of:

1229 tests administered in RTC. These tests include demographic data, attitude data, and information on personal reasons for joining the Navy as well as leisure preferences.

261 tests administered in ATB. These include checks on demographic and attitudinal data previously collected from the same subjects in RTC, and also new attitudinal data related to ATB.

1229 sociometric tests administered in RTC in which each subject was asked to rank order his fellow company members in terms of his perception of how much he talked to each one. A modified Killworth and Bernard technique was used and they very generously made their computer programs available to us for the analysis of the data.

261 "talk to" sociometric tests administered in ATB. These are a subset of the RTC subjects. A modified Killworth and Bernard technique was used.

166 "who do you like" sociometrics administered in ATB (units 4 - 6).

A modified Killworth and Bernard technique was used.

196 interviews conducted with a subset of the RTC subjects who had gone on to PE or OS school.

6 interaction matrices. These contain the counts of interactions between subjects from the six companies in the experiment. The smallest matrix is 37 x 37; the largest 51 x 51.

A description of the method by means of which the interaction data were collected may be found in the author's Technical Report No. 3, A DESIGN FOR OBSERVER SAMPLING OF MEMBER INTERACTION IN A LARGE, SPONTANEOUS GROUP. This report also includes an appendix by Kinley Larntz, DETERMINING SAMPLE SIZE NECESSARY TO DETECT GROUPS FROM INTERACTION FREQUENCIES.

A description of the questionnaires administered in RTC and ATB as well as of the scales developed from the attitude data may be found in the author's Technical Report No. 4, DEVELOPMENT OF MEASURES OF ATTITUDINAL AND STRUCTURAL SIMILARITY.

#### Analysis Techniques

"State of the art" techniques for analyzing questionnaire and interview data were utilized.

P. D. Killworth and H. R. Bernard were very generous in making available the computer programs which permitted analysis of the socio-metric data by the Catij method (Killworth and Bernard, 1974; Killworth and Bernard, 1975).

Multiplicative models were utilized to analyze the interaction data (Larntz and Weisberg, 1976; Sykes, Larntz and Fox, 1976). The use

of the technique expanded to these very large matrices of categorical data permitted the successive entering of variables into the model to test for the effect of each and the cumulative effect of those variables which were retained in improving the fit of the model to the data. The technique is somewhat analogous to multiple regression.

#### Unspecified Conclusions

From an examination of Table 1, it is evident that the largest effect on behavioral structure is membership in previous RTC company. This several week initiatory ordeal very successfully creates lasting solidarity among recruits. This is not only true of the large group environment of the ATB, but also the individualized small group environment of the A school in which former members of an RTC company may not even be in the same room or dormitory building. Nearly 75 percent of A school students report that their main social contacts are with old RTC buddies even several weeks after RTC graduation.

Controlling for the effect of RTC company, it is evident that the second largest effect is from proximity. More specific tests (not shown) indicate that most of the effect of proximity accrues from bunkmates and adjacent racks, or as racks across the isle are included, these additional proxemics make only a small contribution to the total proximity effect. By inference, contact within personal space enhances the proximity effect.

The use of competitive work groups did enhance interaction. While there were effects in all three groups, the strongest effects were in the randomly assigned and integrated groups. This finding is tentatively

Table 1  
 Change in  $G^2$  as a Function of  
 Inclusion of Hypothesized Effect  
 in a Log-linear Model

	Unit and SES Distribution Status <sup>1</sup>						
Effect	1R	2S	3I	4R	5S	6I	
RTC Co <sup>2</sup>	340.0	319.4	885.1	759.4	142.2	517.1	Administered
Proximity <sup>3</sup>	261.0	137.7	214.7	62.9	131.4	73.8	Opportunity
Work Group <sup>4</sup>	--	--	--	26.5	5.1	14.0	Effects
Position <sup>5</sup>	20.6	9.7	4.8	0.4	13.3	12.1	
Liberty Section <sup>6</sup>	62.6	42.2	5.4	12.5	2.5	44.7	
Subtotal	684.2	509.0	1110.0	865.3	294.5	661.7	
Region	1.5	4.4	24.5	5.7	6.6	29.3	Demographic
Color	--	18.7	62.2	67.9	44.9	41.5	and Status
SES	1.1	0.8	1.5	13.3	n.c.	n.c.	Effects
Urban/Rural	n.c.	0.4	35.5	0.5	2.2	16.7	
Education	6.2	6.6	0.6	11.5	4.3	1.5	
Religion	31.6	5.5	0.9	4.3	5.9	0.3	
Politics	3.0	0.5	13.5	6.0	7.7	16.3	
Mar. Status	--	--	--	5.3	0.2	1.4	
Subtotal	51.2	37.4	178.2	218.5	75.0	123.0	
Similarity	n.c.	10.7	58.5	n.s.	5.8	11.7	Attitude
Satisfaction	n.c.	n.c.	0.1	9.2	n.c.	n.c.	Effects
Cohesion	n.c.	n.c.	6.8	15.2	n.c.	n.c.	
Individuality	n.c.	n.c.	1.6	n.s.	n.c.	13.9	
Basic Training	n.c.	0.3	21.7	n.c.	n.c.	5.4	
ATB Supervision	n.c.	n.c.	26.8	n.c.	n.c.	13.5	
Job Equity	n.c.	n.c.	9.3	n.c.	n.c.	0.8	
ATB Success	n.c.	0.1	9.4	12.2	n.c.	n.c.	
Rec. Opport.	n.c.	9.3	22.6	n.c.	n.c.	n.c.	
Subtotal	0.0	20.4	156.8	36.6	5.8	45.3	
Smoking <sup>7</sup>	5.6	9.8	63.4	2.2	1.2	2.2	Miscellaneous
Class Perform. <sup>8</sup>	n.c.	2.1	4.5	13.5	2.3	9.3	Effects
Goals <sup>9</sup>	19.0	12.2	n.c.	14.4	n.c.	2.0	
Subtotal	25.2	24.1	67.9	30.1	3.5	13.5	
Random Fit	2538.8	2038.6	3923.0	2071.5	1688.6	1931.1	
Total Change	760.6	590.9	1512.9	1150.5	379.7	843.5	
Remaining $G^2$	1778.2	1447.7	2410.1	1921.0	1308.9	1087.6	

Table 1 -- Key

<sup>1</sup> R (Randomly assigned to racks), S (maximal SES segregation), I (maximal SES integration).

<sup>2</sup> Typically an ATB unit was composed of groups assigned from about four graduating RTC companies.

<sup>3</sup> Includes bunkmates and adjacent racks; racks two away; racks three away and racks across isle.

<sup>4</sup> Six groups were created as both an educational experiment and experiment on the effect on informal group formation of intragroup competition.

<sup>5</sup> Official positions included Leading Seaman, Assistant Leading Seaman, Educational Petty Officer, Master-at-arms, Clerk, Laundry Petty Officer.

<sup>6</sup> The unit was divided into two liberty sections. Each section had liberty every other night.

<sup>7</sup> Smoke breaks are provided between classes and special areas in the compartment and classroom building are reserved for smoking. Thus smokers have an increased chance of meeting each other.

<sup>8</sup> Performance on daily tests, midquarters and finals is publicly announced. Thus high and low performers are known by reputation.

<sup>9</sup> Reason for joining Navy--career goals, adventure, or patriotism.

interpreted as confirmation of the hypotheses related to the facilitation of interaction within heterogeneous groups by competition. The effects are not great, however.

Occupancy of an official leadership position within the unit effects behavioral structure, as does liberty assignment.

Factors related to administered opportunity do strongly effect behavioral structure. The experience of strong external pressure such as that in RTC has effects which last in creating informal group solidarity. If, in addition, proximity is taken into account, the effect is even more marked. Tentatively, it is concluded that the findings of the previous study in regard to the import of proximity are confirmed.

Demographic and status effects for the most part are much less important. Color has an effect under all conditions. The effect, while significant, is not nearly as important as previous experience and proximity. This tends to support conclusions based on other data that there is little intergroup conflict in the Navy at the present time. In fact, the socio-metric as well as the interaction data document the existence of many highly integrated social groups which developed from the pressures of RTC training combined with proximity.

Education and religion generally have small, significant effects, though this is not true of every unit.

There is no consistent (across units) evidence that attitude similarity has any effects at all. Those effects which do occur (e.g., on the preference for associating with similars scale) tend to be a bit stronger in the integrated units, but this should not be considered a conclusion, merely a possibility warranting further analysis.

On the whole, these data show that of the variables entered in the model, those related to administered opportunity are by far the most important.

The other conclusion is that since the remaining  $G^2$  is still large, that is, since the model is still significantly different from the data, a primary goal of subsequent analysis must be the improvement of the model.

#### Cognitive Structure and Behavioral Structure

One of the most interesting discoveries of the analysis is the partial correspondence between the cognitive structure of the subjects and their behavior. This discovery is important in itself, but also promises to be an important avenue of exploration for improvement of the fit of the model to the data. In the present theory attention is paid primarily to factors which lead to friendship and interaction. Once friendship is established, it is likely that a positive feedback effect occurs. Persons now interact because they are friends. Friendship becomes an independent variable instead of a dependent one (see Proposition vii).

Comparison of the Killworth and Bernard data with the interaction data lends support to this view. If the complete multiplicative model displayed in Table 1 is utilized and then the Freeman-Tukey residuals inspected it is evident that for positive residuals  $\geq 2.00$  there is substantial coincidence with mutual choices on either or both talking and liking sociometrics. For instance, in Unit 6, considering for this purpose 496 cells in the upper right triangular matrix, there are 51 mutual

talking, and 52 mutual liking connections. Of the 40 Freeman-Tukey residuals  $\geq +2.00$ , 17 intersect with the liking mutual connections and 18 with the talking mutual connections. Furthermore residuals  $\geq -2.00$  are associated with apprentices, categorized by the Killworth-Bernard technique as 3 or more steps removed from each other. A formal, statistical method for measuring the extent of the relation between the two measures has not yet been worked out, but that there is such a relation seems very likely. Since it is possible to enter such variables as mutual choice or category distance into the multiplicative model, it is anticipated that doing so will improve the fit and constitute one of the primary modifications of the theory. In effect it will be hypothesized that the cognitive affect structure modifies the behavioral structure, and that knowledge of affect structure is necessary to explain behavioral structure. Affect structure is, however, one variable among many.

There is also some correspondence between groups as detected by plotting relations between subjects related by a Freeman-Tukey residual of  $+2.00$ , and as detected by the Killworth-Bernard technique. The correspondence is only partial. The problem is primarily one of explaining why, for instance, one technique will display a group consisting of subjects 1, 15, 27, 30, and 31 while the other will display a group consisting of 1, 27 and 30 with 17 and 12. The reason for the differences is not clear at this time. Tentatively it is hypothesized that it is a function of a complex of variables including absolute frequency of interaction, comparison level for frequency of interaction and factors which effect perception of interaction including informal group status (as tentatively measured by calculating the average rank of each subject in the columns of the

Killworth and Bernard "distance from persons" matrix.

### Conclusions

Administered opportunity variables have a strong effect on the structure of behavior. Holding administered opportunity variables constant, demographic similarity variables have a much smaller but significant effect. Attitudinal similarity does not have an effect which is either strong or consistent for units taken as a whole.

There is some correspondence between cognitive group structure and behavioral structure.

It is possible, using Freeman-Tukey residuals, to detect behavioral groups. This technique is partially validated by reference to similar groups disclosed using sociometric techniques.

### Future Research

The agenda for continuing analyses of these data is long and intriguing. Some (by no means all) of these items are listed below.

1) While prior common membership in an RTC company is an important variable it appears that while some relative unknowns discovering in ATB that they were in the same RTC company become closer, some do not. Some become very unfriendly. Sykes (1977b) defines attraction as a change away from neutral in either a positive or negative relation and predicts such a change as a result of common occupancy. Those who develop dislike have not yet been carefully analyzed. What leads to dislike? If an individual dislikes his former RTC fellows who is he now attracted to?

Differentiation of affect needs exploration.

- 2) While attitudinal variables may not effect the group-as-a-whole, it may still be that there are subgroups in which they are more important than others. Each subgroup in each unit needs to be modeled separately to discover differences between individual groups.
- 3) The model needs to be revised and tested with special emphasis on the cognitive structure of the group as an independent variable in itself.
- 4) The correspondences between the sociometric and the interaction data needs to be more fully explored. It may be possible to develop a theoretical explanation for non-correspondence or seeming non-correspondence, and test it on these data.

A rich and complex data base has been gathered. While this is a final report, analysis of the "deep structure" of this data is just beginning.

- 5) Finally, certain more practical analyzer need to be written. Satisfaction in RTC and ATB is high. It is also high in A school where most students like individualized instruction and the atmosphere of the school. There needs to be further analysis of the correlates of satisfaction. In addition, the discovery of a correlation between certain leisure preferences and intention to reenlist by Mr. Blank needs explication.

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